

Future Perspective of Diagnostic Imaging for Acute Chest Pain

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Abstract

Nowadays, making quickly a diagnosis in patients with stable chest pain is difficult and cardiovascular diseases are responsible for the vast majority of deaths worldwide.

Unfortunately, the first line exams reported in the guidelines may not suddenly discover the underlying pathology causing chest pain.

The need of a quick and precise diagnosis of acute chest pain etiology in an emergency setting and the unavailability of a single effective and not invasive exam should induce to deploy a new technology to shorten the diagnostic process.

Keywords: *chest imaging; acute chest pain; aortic pathologies.*

INTRODUCTION

Making a quick diagnosis of the chest pain etiology is life-saving in case of life-threatening pathologies. The actual guidelines does not allow a fast and precise diagnostic framing. The aim of this study is to propose a method that may help first-aid physicians doing diagnosis of the chest pain etiology in a more rapid, cheaper and precise way.

DISCUSSION

Discovering the acute chest pain etiology is still challenging [1] and establishing quickly the diagnosis is fundamental in case of life-threatening pathologies, in order to set up speedily the proper therapy.

Up to now, diagnosis of the acute chest pain cause is achieved by making differential diagnosis among the many thoracic and abdominal diseases, excluding at first the life-threatening ones.

Unfortunately, the first line exams reported in the guidelines [2] does not allow discovering in the first instance the underlying pathology causing the chest pain. Therefore, an observation period lasting up to

12 hours, in which further more complex, invasive and expensive exams, is required. During this observation period, electrocardiogram and cardiac markers are repeated, while chest X-ray, echocardiography and enhanced CT-scan help in diagnosing or excluding cardiac and non-cardiac pathologies causing chest pain. All of these exams have limitations. Electrocardiogram and cardiac markers may not be diagnostic in case of coronary artery disease of recent onset, and chest X-ray is useful in excluding diseases of the lung parenchyma but is not helpful in detecting cardiac diseases, pulmonary embolism and aortic diseases. Chest X-ray and echocardiography have a low sensibility in diagnosing aortic aneurism or dissection [3]. In case of aortic dissection, one of the major limitations of either transthoracic or transesophageal echocardiography, is the frequent possibility of artifacts that mimic a dissection flap [4]. Enhanced CT-scan has high sensibility and specificity in diagnosing coronary artery disease and aortic pathologies [1,5], but it can't be performed to patients allergic to the contrast medium. All of these

Future Perspective of Diagnostic Imaging for Acute Chest Pain

non-invasive and invasive diagnostic exams result in a resource-consuming problem known worldwide [6].

In 2016, the National Institute for Health and Care Excellence (NICE) updated its guidelines for the evaluation of acute chest pain, in which all patients with new onset chest pain should be investigated with a coronary computed tomographic angiography as a first-line exam [6]. However, computed tomographic angiography remains to be evaluated in its invasiveness and especially in its cost effectiveness for the evaluation of new onset chest pain [7]. Furthermore, it may not allow diagnosing other chest pathologies.

The need of a quick and precise diagnosis of acute chest pain etiology in an emergency setting and the unavailability of a single effective and not invasive exam should induce the medical engineers to devise a new diagnostic instrument. This instrument must detect the cause of chest pain and exclude the life-threatening pathologies shortly and without the need to perform other exams. It must not be invasive (i.e. radiation-free and contrast medium-free), and must overcome possible problems in patient's approach to the methodology, such as claustrophobia and allergy to the contrast medium. May it be a non-contrast-enhanced MRI with a smaller coil dedicated for the study of the chest and equipped with a specific software?

Probably, the cost of MRI would be inferior than the total cost of all the exams required for the patients with acute stable chest pain, as well as the use of health personnel and the time to diagnosis. The limitation of MRI is essentially due to the presence of pacemaker and specific metallic prosthesis; therefore, it can be applied to the majority of patients.

CONCLUSION

Performing a non-contrast-enhanced chest MRI in high risk patients presenting with recent onset of chest pain will allow saving more lives in a cheaper way.

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Citation: Eva Intagliata, MD, PhD. *Future Perspective of Diagnostic Imaging for Acute Chest Pain*. *Archives of Radiology*. 2020; 3(2): 08-09.

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